Geologic Map of the Little Wood River Reservoir 7.5' Quadrangle, Blaine County, Idaho

by

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2014 D'

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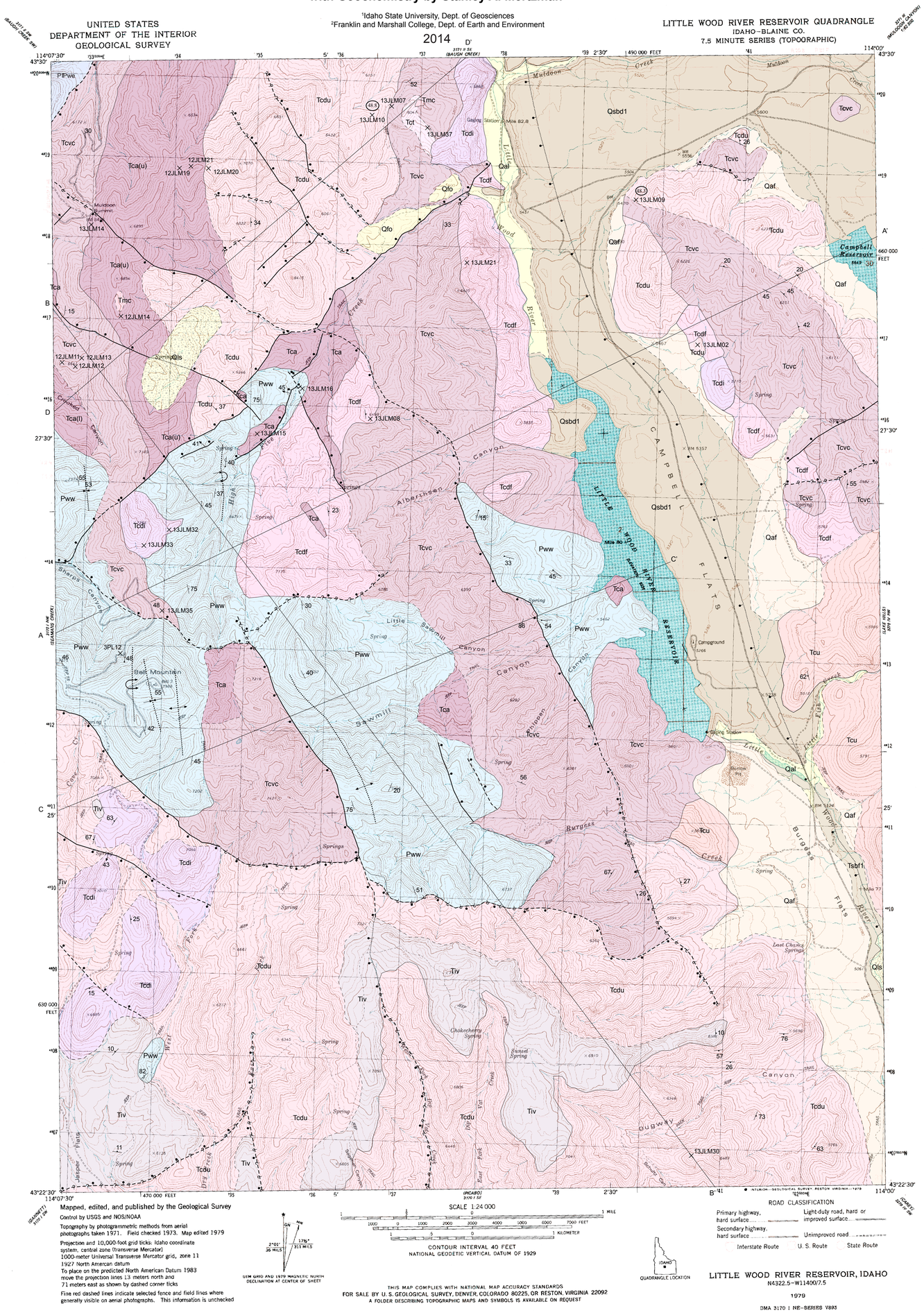
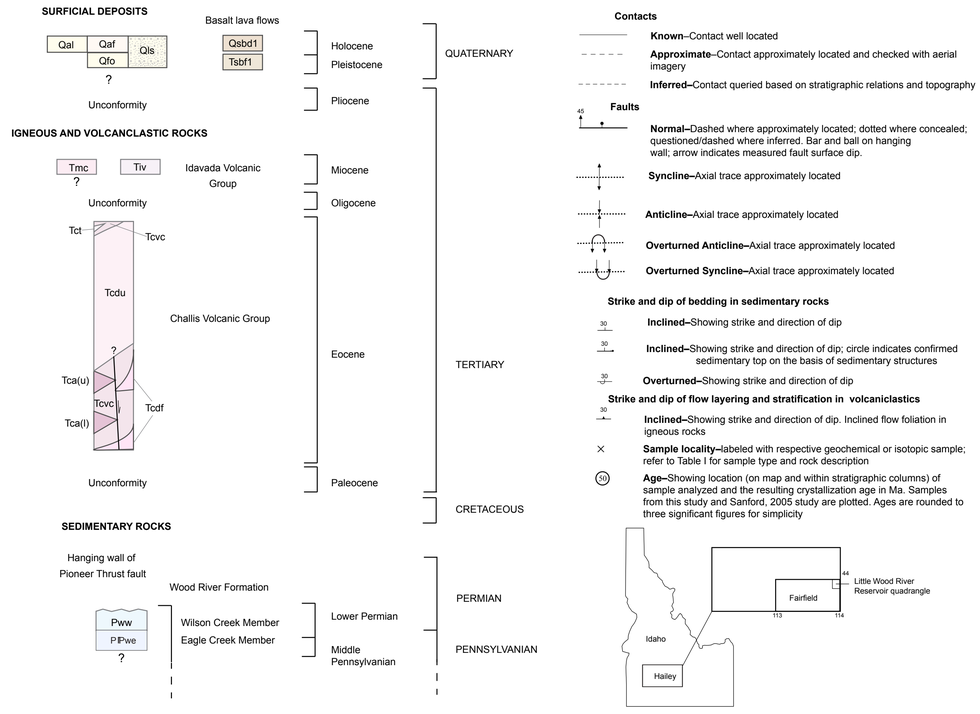
Meyers, J.L., 2014 Eocene magmatic evolution and synchronous to subsequent extensional faulting, Little Wood River Reservoir quadrangle, Blaine county, Idaho: Idaho State University, M.S. thesis, 72 p.



CORRELATION OF MAP UNITS



EXPLANATION OF MAP SYMBOLS

DESCRIPTION OF MAP UNITS

Surficial deposits-unconsolidated (Quaternary)

Qal Alluvium (Holocene)
Sand to clay with subangular to rounded clasts, mostly of local derivation. Stream deposits are present in low areas, and are subject to seasonal flooding, and reservoir drainage levels and rates.

Qaf Younger alluvial fan deposits (Holocene to Late Pleistocene?)
Sand and pebble to cobble gravels of local derivation in a sandy to silty matrix. Present at mouths of drainages and below slopes dipping into the Little Wood River valley.

Qls Landslide deposits (Holocene to Early Pleistocene)
Subangular to angular non-stratified pebble to boulder gravel of local derivation. Includes landslide and slump deposits. Typically overlies its sources in Challis Volcanic Group.

Qfo Older alluvial fan deposits (Late to Early Pleistocene?)
Sand and pebble to cobble gravels of local derivation in a variable silt to clay matrix. Forms valley-parallel terraces in High Five Creek. Represents Pleistocene drainage and valley morphology.

Basalt lava flows (Quaternary)

Qsbd1 Valley-filling basaltic lava flows (Pleistocene)
Very dark grey to black aphanitic intracanyon basalt flows. Columnar jointing visible at local outcrops. This unit is present in the Little Wood River valley and is overlain by a light grey/brown loess. Outcrops are visible at river-incised locations and at the mouths of major drainages, such as High Five Creek. The source vent has been identified to the northeast of the Little Wood River valley upstream of the map area. Thickness of <100 feet. K-Ar age is 433 +/- 78 ka (Kuntz et al., 2007).

Tsbf1 Basaltic lava flows of upper Little Wood River and South fork Muldoon Creek areas (Early Pliocene)
Dark grey aphanitic intracanyon basalt flow only found in the extreme southeastern part of the quadrangle along the Little Wood River. The source vent for this Pliocene flow is unknown. K-Ar age is 3.55 +/- 0.13 Ma (Kuntz et al., 2007).

Idavada Volcanics and Challis-sourced surfical deposits (Miocene)

Tiv Idavada Volcanic Group - rhyolite ignimbrites (Miocene)
Dark grey (weathers to brown on surface) aphanitic lithophysal welded rhyolite ignimbrite sheets. This unit caps dacite lavas medial in the Challis stratigraphic section in the south. The unit dips gently toward the Snake River Plain at low dips of <5 degrees, comparable to the Lake Hills quadrangle to the east (Michalek, 2009). Thickness of ~150 feet.

Tmc Fluvial conglomerate (Eocene-Miocene?)
Unconsolidated rounded to subrounded pebbles and cobbles derived from Challis Volcanic Group. Clast lithologies include dacitic tuff, dacite lava, vitrophyre, welded rhyolite ignimbrite, rhyolitic airfall tuff, andesite lava, hornblende-biotite tuff, volcanic breccia, and lithic-vitric tuff. This unit unconformably overlies Challis Volcanic Group in the Muldoon Pass area, but does not contain demonstrable Idavada Volcanic Group clasts. It is interpreted as pre-Idavada. Thickness of ~40 feet.

Challis Volcanic Group (Eocene)

Tcu Challis Volcanic Group - undifferentiated (Eocene)
Crystal-poor, brecciated and silicified volcanic rocks, undifferentiated.

Tcdi Dacite intrusions (Eocene)
Dark to medium purple/grey porphyritic hypabyssal dacite intrusions with dome-like morphologies. General mineral composition is similar to that of dacite lavas (Tcdu): 25% (<1-2mm) euhedral plagioclase, 15-20% (1mm or less) sub-euhedral hornblende, 10-15% (<0.5mm) sub-euhedral biotite, 2% (<1mm) anhedral quartz, 2-5% xenoliths, and 30-45% siliceous and plagioclase rich groundmass.

Tcdu Dacite lava flows, flow-domes, hypabyssal intrusions - undifferentiated (Eocene)
Dark to medium purple/grey porphyritic flow domes, and hypabyssal intrusive bodies, and isolated and patchy white air-fall rhyolitic tuffs. General mineral composition for dacite lavas is: 40-55% (1-12mm) sub-euhedral plagioclase phenocrysts, 10-15% (1-2mm) sub-euhedral hornblende, 5-10% (1-2mm) sub-euhedral biotite, +/- <2% (1-3mm) subhedral sanidine, and 30-40% aphanitic quartz and plagioclase rich groundmass. Outcrops of lava flows occasionally display basal auto-brecciation and flow foliations. Porphyritic dacite outcrops that are inconclusively hypabyssal intrusions i.e. those that cannot be delineated based on map relations and mineral textures, are included in this undifferentiated unit. Maximum thickness of dacite lava flows (excluding intrusions) 3280 feet.

Tct Lithic-vitric tuff (Eocene)
Very dark-grey welded lithic-vitric tuff; matrix is vitrophyric, lithics are pink, green, and yellow Challis derived glassy volcanic rocks. Fiamme texture is present locally. The mineralogy in this unit overall is 25-30% amorphous volcanic glass, 10-25% (1mm or less) subhedral to fragmented plagioclase, 10-15% (2-75mm) lithics and fiamme (includes xenoliths of angular quartz), <5% (<1mm) subhedral to fragmented hornblende, <5% (<<1mm) subhedral to fragmented biotite, and 25% siliceous groundmass. A mineral alignment typically parallels the welding texture, and rounded amygdules ~ 1mm in diameter are filled with volcanic glass. Thickness of 200 feet.

Tca(u) Upper andesite lava flows (Eocene)
Dark grey fine crystalline to aphanitic vesicular andesite lava flows. General mineral composition is: 50% (<1mm) subhedral plagioclase, 15% (~1mm) hornblende needles, 5% (<1mm) stubby subhedral pyroxene, 5% (<.5mm) subhedral olivine, and 25% aphanitic plagioclase-rich groundmass. Locally celadonite alteration and siliceous amygdules are present. Mafic minerals typically highly weathered. Thickness of 1000 feet.

Tcvc Volcaniclastic rocks (Eocene)
Polymict volcanic conglomerate interpreted as fluvial and lahar deposits. The matrix is typically a light to medium grey biotite-hornblende bearing dacitic tuff with a mineral composition of 15-20% (1-2mm) sub-euhedral biotite, 10-20% (<1-2mm) hornblende needles, and 60-75% very fine ashy groundmass. This unit crops out in several ways: 1) matrix-supported volcanic breccia and conglomerate with weak internal stratification and rounded to angular pebble to boulder clasts of vitrophyre, pumice, andesitic lava flow, dacitic lava flow, and hornblende-biotite tuffs; 2) hornblende-biotite bearing tuffs; 3) conglomerate of rounded volcanic pebbles and cobbles; ,4) reworked thinly bedded tuffs, and 5) angular monomict volcanic breccia. These variable rocks likely represent inter-eruption periods and active stream systems. Thickness of 560-2160 feet.

Tca (l) Lower andesite lava flows (Eocene)
Very dark grey fine-crystalline andesite lava flows. General mineral composition is: 35% (<6mm) sub-euhedral plagioclase, 10% (<1mm) subhedral stubby pyroxene, 10% (<.5mm) subhedral olivine, 5% brown amorphous silica (glass), and 40% plagioclase-rich aphanitic groundmass. This unit also includes possible fault-related andesite plugs. This unit grades into the overlying Tcvc unit, observable west of Muldoon summit in thin andesite lava flows interbedded with basal volcaniclastic rocks in Tcvc. Thickness of ~1040 feet.

Tcdf Dacite lava flows (Eocene)
Light purple/maroon medium-crystalline porphyritic crystal-rich dacite. General mineral composition is: 20% subhedral plagioclase <1mm, 20% subhedral needle-like hornblende <1-3mm, 15% subhedral vitreous sanidine 1-2mm, 10% subhedral biotite <2mm, 15% sub-anhedral quartz <1mm, and 20% aphanitic groundmass. Mafic minerals are typically heavily weathered at hand-sample scale. Crops out in blocky minor to moderate cliffs, and thins to the west. Thickness of 0-1160 feet.

Sun Valley Group

Wood River Formation (Lower Permian to Middle Pennsylvanian)

Pww Wood River Formation
Wilson Creek Member (Lower Permian)
Thin-bedded and laminated light brown graded sandy and silty micritic limestone, locally bearing Permian fusulinids, dark grey siltstone, and thin-medium bedded micritic sandstone. Thickness of ~2624 feet (Link et al.,1994).

PPwe Eagle Creek Member (Late Pennsylvanian-Middle Permian)
Light brown fine to medium grained thin to medium bedded calcaerous sandstone, and light grey to white friable quartz arenite. Thickness of ~3575 feet (Link et al.,1994).

GEOLOGIC HISTORY

Middle Pennsylvanian- Lower Permian
The oldest deposits present in the Little Wood River Reservoir quadrangle are the Wilson Creek and Eagle Creek members of the Wood River Formation (Sun Valley Group). These sedimentary units were deposited in the Wood River Basin in central Idaho in the Paleozoic; specifically Eagle Creek in the Middle Pennsylvanian until the Lower Permian, and Wilson Creek during the Lower Permian.

Cretaceous (?)
Paleozoic Wood River Formation rocks are folded into a system of tight upright to overturned westward verging folds. The folding is presumably Cretaceous due to its association with the underlying Pioneer thrust fault, although no quantitative data exists.The westward vergence is likely a local style of deformation as Mesozoic folding and thrusting in western North American typically exhibits eastward vergence.

Eocene
Eocene volcanism initiated during Middle Eocene time (48.8 Ma +/- 2.4 U-Pb; 49.5 Ma +/-0.1 Ma Ar/Ar) in the Little Wood River Reservoir quadrangle based on U-Pb and Ar/Ar analyses (Sanford, 2005). A series of andesite and dacite lavas flows were extruded and deposited unconformably on the Wilson Creek and Eagle Creek members of the Wood River Formation, followed by a vitric-lithic tuff and shallow dacite intrusions and isolated and thin rhyolitic airfall tuffs. Lower and medial intermediate volcanism ceased by approximately 47 Ma (47.5 Ma +/- 0.1 Ar/Ar) and all of Challis volcanism ceased by 45 Ma (45.6 Ma +/- 0.1 Ar/Ar). Trans-Challis associated extension initiated synchronously with the onset of Challis volcanism.

Miocene
The fluvial conglomerates (Tcc) were derived from previously deposited Challis volcanic rocks. There are no clasts of Wood River Formation present in these conglomerates. The rhyolitic ignimbrites of the Idavada Volcanic Group were erupted during Miocene time and cap the medial dacites (Tcdu) in the southern part of the quadrangle. The Idavada ignimbrites dip shallowly (<5°) toward the Snake River Plain. Basin and Range associated extension began shortly after Idavada volcanism.

Quaternary
The valley-filling basalt lava flow in the quadrangle erupted as a result of Pleistocene hot spot volcanism. It is covered by soil and loess.

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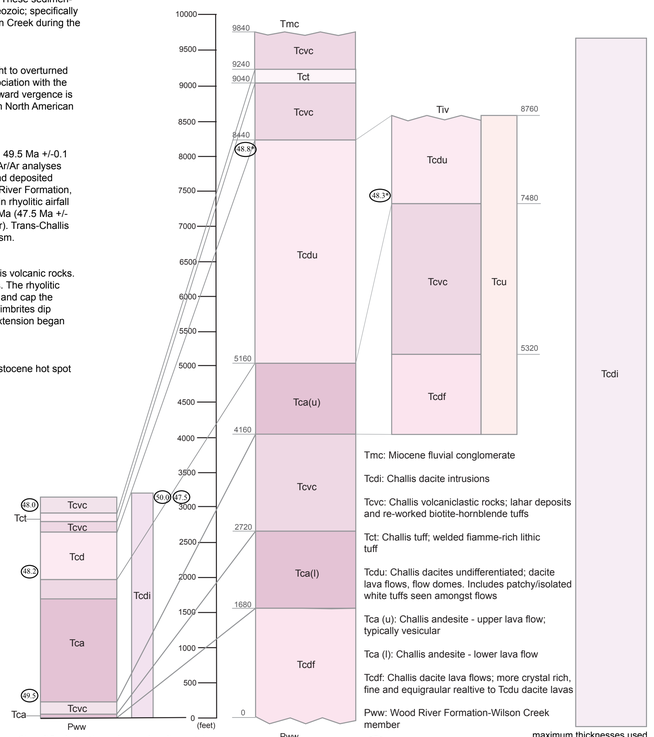
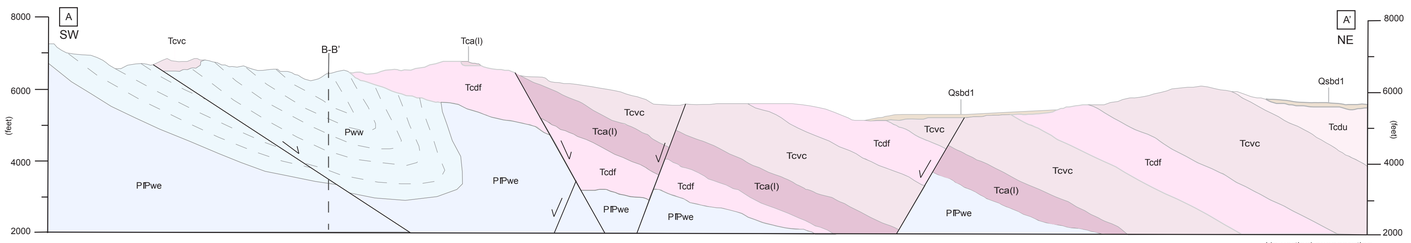
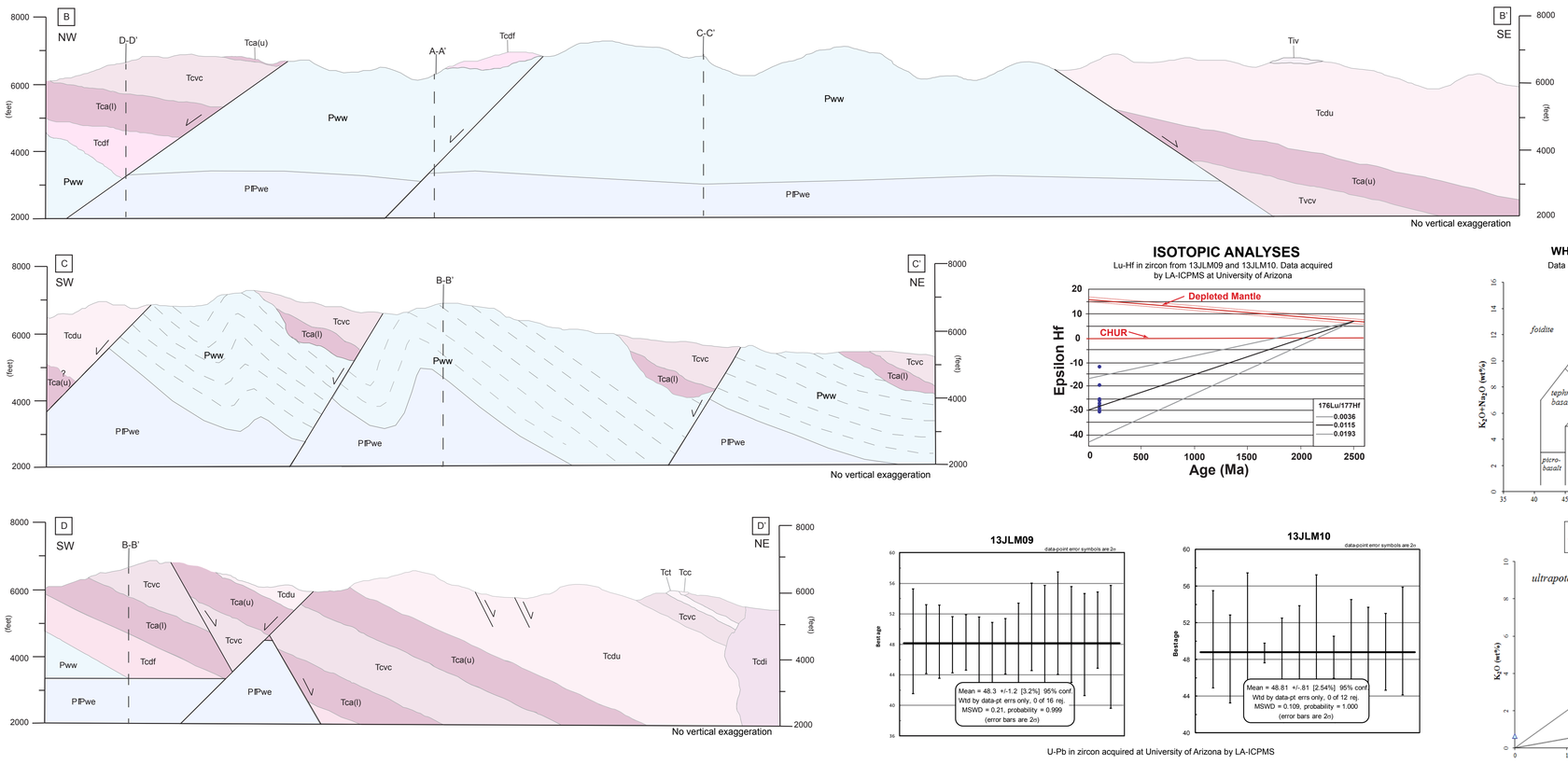
STRATIGRAPHIC COLUMN OF LOCAL CHALLIS STRATIGRAPHY



Simplified stratigraphy and radiometric ages (Ar/Ar) from Sanford, 2005.





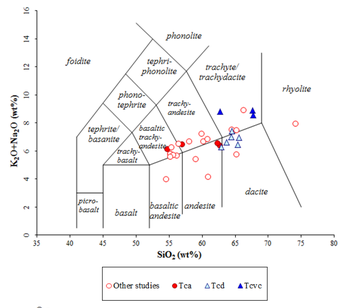
ISOTOPIC ANALYSES

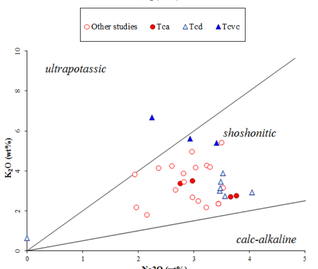
Lu-Hf in zircon from 13JLM09 and 13JLM10. Data acquired by LA-ICPMS at University of Arizona

U-Pb in zircon acquired at University of Arizona by LA-ICPMS

WHOLE ROCK GEOCHEMISTRY

Data acquired at Franklin and Marshall College





SAMPLES

Sample ID	Type	Northing	Easting	Location	Description	Unit
12JLM09	Geochemistry	4816608	732358	Seamans	andesite lava flow	Tca(l)
12JLM11	Geochemistry	4816621	732565	Seamans	hornblend-biotite tuff	Tcvc
12JLM12	Thin section	4816577	732731	LWRR	hornblend-biotite tuff/volcaniclastics	Tcvc
12JLM13	Geochemistry	4816681	732805	LWRR	andesite lava cropping out in volcaniclastics	Tca(l) in Tcvc
12JLM19	Thin section	4819050	733942	LWRR	vesicular andesite lava flow	Tca(u)
12JLM20	Geochemistry, Thin section	4819069	734075	LWRR	porphyritic dacite lava flow	Tcdu
12JLM21	Geochemistry, Thin section	4819077	734214	LWRR	andesite lava flow	Tca(u)?
12JLM23	Geochemistry	4820575	736209	BC-SW	dacitic tuff amongst porphyritic dacite lavas	Tcdu
12RL119	Geochemistry	4809944	733524	LWRR	porphyritic dacite lava	Tcdu
12RL120	Geochemistry	4809179	733267	LWRR	hornblende-biotite tuff/volcaniclastics	Tcvc
12RL130	Thin section	4819353	731660	Seamans	andesite lava flow	Tca(l)
3PL12	Isotopic, detrital	4812885	733509	LWRR	light tan fine-medium grained quartz arenite	Pww
13JLM02	Geochemistry	4816716	740522	LWRR	rhyolitic airfall tuff on dacite lavas	Tcdu
13JLM07	Geochemistry	481990	736628	LWRR	hornblende-biotite tuff	Tcvc
13JLM08	Geochemistry	4815971	736452	LWRR	vitrophyre	Tcdf
13JLM09	Isotopic	4818656	739651	LWRR	porphyritic dacite lava	Tcdu
13JLM10	Isotopic	4819705	736528	LWRR	porphyritic dacite lava	Tcdu
13JLM14	Isotopic	4818243	732798	LWRR	andesite lava flow	Tca(u)
13JLM15	Isotopic	4815747	734995	LWRR	andesite lava flow	Tca(l)
13JLM21	Geochemistry, Thin section	4817653	737386	LWRR	porphyritic dacite lava flow	Tcdf
13JLM30	Geochemistry	4807081	740535	LWRR	porphyritic dacite lava	Tcdu
13JLM32	Geochemistry	4814603	733927	LWRR	porphyritic dacite intrusions	Tcdi
13JLM33	Thin section	4814408	733621	LWRR	porphyritic dacite intrusions	Tcdi
13JLM35	Geochemistry	4813611	733862	LWRR	andesite lava flow	Tca
13JLM37	Thin section	4819626	736977	LWRR	vitric-lithic tuff	Tct

Sample	12 JLM 009	12 JLM 011	12 JLM 013	12 JLM 020	12 JLM 021	12 JLM 023	12 RL 119	12 RL 120	13JLM-02	13JLM-07	13JLM-08	13JLM-30	13JLM-32	13JLM-35
SiO2	55.80	60.56	62.07	63.16	53.69	65.72	63.38	64.35	64.66	63.36	61.85	64.09	60.98	61.84
TiO2	0.78	0.59	0.57	0.67	0.86	0.51	0.65	0.50	0.17	0.51	0.64	0.58	0.66	0.62
Al2O3	13.53	14.65	14.58	14.94	13.46	14.30	15.23	14.35	2.63	13.48	13.77	15.14	14.75	14.77
Fe2O3	3.01	2.59	3.18	4.66	3.43	3.09	4.89	2.43	0.05	3.39	5.88	4.38	5.59	4.13
FeO	4.52	1.11	2.25	0.73	4.79	0.97	0.63	1.99	0.12	0.53	0.31	0.62	0.41	1.78
MnO	0.15	0.27	0.13	0.07	0.14	0.05	0.05	0.08	0.12	0.05	0.00	0.08	0.00	0.09
MgO	5.40	2.10	4.55	2.37	6.98	1.32	1.94	3.33	0.29	1.45	3.71	2.07	3.64	4.09
CaO	7.53	5.76	4.89	3.70	7.73	2.51	4.44	3.96	0.28	2.27	4.12	4.47	4.45	4.93
Na2O	2.92	3.29	3.63	3.45	2.71	2.84	3.98	3.42	0.00	2.10	3.37	3.40	3.45	3.74
K2O	3.41	5.22	2.66	3.61	3.20	5.46	2.89	3.39	0.62	6.25	3.05	2.94	2.65	2.73
P2O5	0.46	0.26	0.21	0.27	0.45	0.25	0.22	0.20	0.05	0.17	0.25	0.19	0.24	0.25
LOI	2.61	4.00	1.39	2.50	2.45	3.25	1.81	2.38	1.10	5.91	2.91	1.99	2.28	1.36
Total	100.10	100.40	100.08	100.33	99.92	100.17	100.11	100.08	100.09	99.48	99.92	99.95	100.14	100.33
Fe2O3T	8.03	3.82	5.68	5.47	8.74	4.06	5.59	4.64	0.18	3.98	6.22	5.07	6.05	6.11
Rb	69.60	133.60	64.40	100.50	55.30	146.30	58.7	107.8	18.60	124.30	63.50	55.10	41.80	62.10
Sr	818.00	520.00	712.00	650.00	901.00	595.00	685	674	30.00	301.00	751.00	819.00	741.00	731.00
Y	22.30	19.80	18.20	24.10	26.00	19.40	20.1	18.7	14.40	12.00	18.00	19.50	20.40	19.20
Zr	185.00	203.00	180.00	188.00	179.00	200.00	205	200	147.00	200.00	168.00	152.00	174.00	177.00
V	162.00	116.00	107.00	119.00	180.00	80.00	104	87	55.00	47.00	106.00	83.00	103.00	93.00
Ni	60.00	53.00	120.00	69.00	55.00	18.00	71	67	10.00	17.00	103.00	42.00	98.00	107.00
Cr	273.00	240.00	386.00	113.00	334.00	95.00	221	277	119.00	39.00	467.00	165.00	288.00	248.00
Nb	11.70	17.50	15.10	20.60	13.10	20.90	13.7	17.5	4.40	22.60	16.60	15.80	18.70	20.30
Ga	15.80	17.60	18.70	18.60	16.00	18.10	19.1	19.1	4.80	17.90	19.00	19.40	19.70	19.90
Cu	59.00	20.00	28.00	27.00	67.00	15.00	23	22	12.00	29.00	46.00	24.00	44.00	30.00
Zn	78.00	50.00	62.00	73.00	75.00	52.00	67	56	13.00	41.00	73.00	57.00	78.00	66.00
Co	35.00	11.00	27.00	21.00	58.00	25.00	24	20	16.00	15.00	33.00	24.00	26.00	27.00
Ba	1674.00	2247.00	1402.00	1450.00	1875.00	1281.00	1458	1560	149.00	1286.00	1619.00	1455.00	1448.00	1425.00
La	44.00	40.00	40.00	46.00	42.00	50.00	44	45	23.00	56.00	49.00	45.00	49.00	46.00
Ce	123.00	106.00	101.00	109.00	126.00	115.00	104	112	23.00	114.00	122.00	110.00	126.00	119.00
U	2.20	4.80	5.80	6.70	2.30	3.50	4.3	4.4	1.20	2.40	3.10	2.40	0.50	1.10
Th	4.30	6.80	6.90	20.20	<0.5	24.00	6.6	11.7	4.70	26.30	8.50	8.70	8.10	9.10
Sc	19.00	14.00	12.00	13.00	26.00	9.00	14	11	<1	1.00	12.00	9.00	12.00	8.00

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